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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/857,822	09/24/2001	Mark Stephen Sherwin	30794.58USWO	2596
22462	7590	08/06/2004	EXAMINER	
GATES & COOPER LLP HOWARD HUGHES CENTER 6701 CENTER DRIVE WEST, SUITE 1050 LOS ANGELES, CA 90045			PHAN, THAI Q	
			ART UNIT	PAPER NUMBER
			2128	

DATE MAILED: 08/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/857,822

Applicant(s)

SHERWIN ET AL.

Examiner

Thai Q. Phan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09/24/2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09/24/2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>02/11/2002</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This Office Action is in response to patent application S/N: 09/857,822, filed on 09/24/2001. Claims 1-17 are now pending in the Action.

Specification

This application does not contain an abstract of the disclosure as required by 37 CFR 1.72(b). An abstract on a separate sheet is required.

Drawings

The drawings filed on 09/24/2001 are acceptable for examination.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 2, 8, 9, 10, 11, 12, and 13 are rejected under 35 U.S.C. 102(e) as being clearly anticipate by Franson, James, US patent no. US 6,678,450 B1.

As per claim 1, Franson anticipates a method and system for quantum computing to construct the quantum gates with feature limitations identical to the claimed invention (Summary of the Invention). According to Franson, the quantum computing method includes applying electromagnetic field in a cavity to excite semiconductor quantum bits (col. 6, lines 31-39, lines 52-65, col. 8, lines 60-62, for example), coherently coupling the

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quantum bits using a mode in the cavity that has a resonant frequency substantially coincident with a transition between the energy levels of the quantum bits in the solid material of semiconductor (col. 9, lines 17-33, col. 21, lines 39-54, col. 22, line 8 to col. 27, line 16, col. 28, lines 42-67).

As per claim 2, Franson anticipates quantum bits in solid state material including an array or a crystal lattice of atoms or electrons in quantum computing as claimed (cols. 29-30).

As per claims 8-13, Franson anticipates the claimed limitations for exciting ion trapped in the resonant cavity.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 3-7, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Franson as applied to claim 1 above, and further in view of Devoe, Ralph, US patent no. 5,793,091.

As per claims 3-7 and 14-15, Franson discloses a method and system for quantum computing. Franson does not expressly disclose quantum dot doped with ion or electron for quantum computing as claimed. Such feature is however well known in the art. In fact, Devoe teaches a quantum computer designed with quantum dot doped with ion for transferring information state in an optical coupling resonant cavity. This ion

doped quantum dot is to transfer logic and quantum information for the quantum computer as taught in Devoe.

This would motivate practitioner in the art at the time of the invention was made to combine the teaching in Devoe into Franson quantum computing by incorporating quantum dot doped with ion as taught in Devoe into Franson disclosure in order to perform logic operation as in NOT exclusive gate.

3. Claim 17 is rejected under 35 USC 103 (a) as being unpatentable over Franson (US patent no. 6,678,450 B1) in view of Devoe, Ralph, US patent no. 5,793,091

As per claim 17, Franson discloses a quantum computing system for computing logic gate operation such as controlled NOT operation as claimed. The logic operation is taken place in an excited microcavity (see rejection in claim 1 above). Franson does not expressly disclose the claimed ion doped quantum dot for transferring logic information state in quantum computing as claimed. Such feature is however well known in the art. In fact, Devoe teaches a quantum computer. Devoe teaches the quantum computer is designed with quantum dot doped with ion for transferring information state in an optical coupling resonant cavity. This ion doped quantum dot is to transfer logic and quantum information for the quantum computer as taught in Devoe.

This would motivate practitioner in the art at the time of the invention was made to combine the teaching in Devoe into Franson quantum computing by incorporating quantum dot doped with ion as taught in Devoe into Franson disclosure in order to perform logic operation as in NOT exclusive gate.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claim 16 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Devoe, US patent no. 5,793,091.

As per claim 16 and 17, Devoe anticipates a quantum computing method and system for quantum logic gates and quantum communication channels with features limitations identical to the claimed invention. According to Devoe, the method includes step of manipulating the state of the ion elements in the quantum dots by turning the energy levels of the electrons into and out of resonance with the frequencies of the cavity and the laser beam (col. 9, lines 34-45, col. 14, lines 26-63, Figs. 12-13).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

1. US patent no. 5,530,263, issued to DiVincenzo, David, on June 1996
2. US patent no. 5,793,091, issued to Devoe, Ralph, on Aug. 1998
3. US patent no. 5,917,322, issued to Gershenfeld et al, on June 1999
4. US patent no. 6,472,681 B1, issued to Kane, Bruce, on Oct. 2002
5. US patent no. 6,437,413 B1, issued to Yamaguchi et al, on Aug. 2002

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6. US patent no. 6,678,450 B1, issued to Franson, James, on Jan. 2004

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Thai Q. Phan whose telephone number is 703-305-3812.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jean Homere can be reached on 703-305-9704. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Aug. 01, 2004



Thai Phan
Patent Examiner
Art Unit 2128